NOTES

CLARIFICATION OF THREE *CAMISSONIA BOOTHII* SUBSPECIES' DISTRIBUTIONS IN CALIFORNIA.—Scott D. White, Tierra Madre Consultants, 1159 Iowa Ave., Suite E, Riverside, CA 92507 (present address: Psomas and Associates, 3187 Red Hill Ave., Suite 250, Costa Mesa, CA 92626) and Andrew C. Sanders, Herbarium, Department of Botany and Plant Sciences, University of California, Riverside, CA 92521.

Distributions of *Camissonia boothii* (Douglas) Raven ssp. *boothii* and *C. boothii* ssp. *alyssoides* (Hook. & Arn.) Raven have been confused in California floras due to revised taxonomy, a mis-annotated specimen, and insufficient documentation of a southern Mojave Desert population. Munz (1935, A Manual of Southern California Botany, Claremont Colleges, Claremont, CA; and 1959, A California Flora, University of California Press, Berkeley, CA) reported *C. boothii* ssp. *boothii* in the southern Mojave Desert, but omitted it from his later Flora of Southern California (1974, University of California Press, Berkeley, CA), replacing it with *C. boothii* ssp. *alyssoides.* Wagner (1993, *Camissonia*, in Hickman [ed.], The Jepson Manual, University of California Press, Berkeley, CA) indicated that neither taxon occurs in the southern Mojave. Skinner and Pavlik (1994, Inventory of Rare and Endangered Vascular Plants of California, California Native Plant Society, Sacramento, CA) included both taxa on their watch list, reporting *C. boothii* ssp. *boothii* in Inyo, Mono, and San Bernardino Counties and *C. boothii* ssp. *alyssoides* in Lassen County. We reviewed taxonomic treatments and herbarium specimens at UCR and RSA of these and a third, related subspecies, *C. boothii* ssp. *intermedia*, seeking to clarify their distributions in California. All three subspecies flower late in the growing season and are relatively widespread in the Great Basin, reaching California at the western limits of their ranges (Raven 1969, Contributions of the U.S. National Herbarium 37:161–396).

Munz (1928, Botanical Gazette 85:233–270) recognized *C. boothii* ssp. *boothii* and *C. boothii* ssp. *alyssoides* as full species, *Oenothera boothii* Dougl. and *O. alyssoides* Hook. & Arn., and retained this nomenclature in his 1959 flora (*op. cit.*). He published a second *Oenothera* treatment in 1965 (North American Flora Series II, Part 5:1–231), ranking both taxa as subspecies within *O. boothii,* and describing the closely related *O. boothii* ssp. *intermedia* Munz. This new taxon included a series of specimens with character states intermediate between *O. boothii* and *O. alyssoides.* Raven (*op. cit.*) transferred *O. boothii* to *Camissonia,* retaining these subspecific taxa. Subsequent authors (Munz 1968, Supplement to A California Flora, University of California Press, Berkeley, CA; Munz 1974, *op. cit.*; Wagner *op. cit.*) have followed Raven's nomenclature.

Munz (1935, *op. cit.*) first reported *Camissonia boothii* ssp. *boothii* (as *Oenothera boothii*) occurring in the southern Mojave Desert, as "rare in So. Calif. (Hesperia region on Mojave Desert)." The only specimen housed locally that would have supported his report was collected at Victorville in 1916 (*Frank Pierson 792* RSA), though Raven (*op. cit.*) cited two specimens in other collections (*S. B. & W. F. Parish 1504* DS, F, GH; and *Abrams 2166* no herbarium cited) from the same area. Pierson's specimen was annotated by Raven in 1966–1967 as *C. boothii* ssp. *alyssoides* but was cited in his monograph (*op. cit.*) as *C. boothii* ssp. *boothii*. Curiously, he did not map either taxon in the southern Mojave Desert (*op. cit.*:359). Munz, evidently working from the annotated RSA collection (i.e., *Pierson 792*) rather than citations in Raven's monograph, reported *C. boothii* ssp. *alyssoides* rather than *C. boothii* ssp. *boothii* in his second southern California flora (1974 *op. cit.*).

Camissonia boothii ssp. *boothii* and *C. boothii* ssp. *alyssoides* are distinguished by pubescence characters and dimorphic vs. monomorphic seeds (Raven *op. cit.*; Wagner

1993 *op. cit.*). *Camissonia boothii* ssp. *intermedia* and *C. boothii* ssp. *boothii* share these character states; they are distinguished by stature, leaf shape, and leaf margin characters. Wagner (*op. cit.*) noted that *C. boothii* ssp. *boothii*'s (mature) fruits are wider (1.4–2 mm) than those of the other two subspecies (1–1.4 mm), though this character does not appear in his key. We also note that *C. boothii* ssp. *boothii* capsules are generally shorter (ca. 10–14 mm) and less twisted (sickle-shaped, ascending and arching outward, bent twice at most) whereas *C. boothii* ssp. *alyssoides* and *C. boothii* ssp. *intermedia* capsules are longer (≥ 14 mm), usually serpentine, bent twice or more, not usually ascending, and more commonly bending downward (illustrated for *Oenothera alyssoides* in Abrams 1951, Illustrated Flora of the Pacific States III, Stanford University Press, Stanford, CA:203).

Pierson's Victorville specimen keys to *C. boothii* ssp. *boothii*, though its capsules are longer and more twisted than typical, resembling those of *C. boothii* ssp. *intermedia* (the southern Mojave *C. boothii* ssp. *boothii* population is illustrated as *Oenothera boothii* in Jaeger 1941, Desert Wild Flowers, Stanford University Press, Stanford, CA:170). Three additional southern Mojave Desert specimens at UCR are similar in all character states, including capsule shape: *Ken Kroesen s.n.* (11 Aug. 1981, "southern Mojave Desert, collected along the Mojave River 1/2 mile upstream from Oro Grande, soil very sandy"); *Stephen Myers s.n.* (26 Sept. 1989, "Apple Valley, Yucca Loma Rd. at the Mojave River, 2800 ft. elev."); and *Stephen Myers 91–50* (27 Aug. 1991, "at the foot of the San Bernardino Mts., near Hesperia, Mojave River 1 mi. N. of Mojave Forks Dam"). These collections certainly represent the populations Munz reported in 1935 (*op. cit.*). One additional specimen, *R. Hoffman 576* POM, collected near Little Lake in Inyo Co., has capsules much like the southern Mojave Desert plants.

The southern California locations are far distant from the remainder of *C. boothii* ssp. *boothii*'s reported distribution and were erroneously excluded from the distribution as described in *The Jepson Manual* (Wagner *op. cit.*). The only other California *C. boothii* ssp. *boothii* we have seen were several specimens collected near Mono Lake (ca. 370 km north) and Hoffman's specimen near Little Lake, ca. 160 km north, annotated by Raven as "out of normal range" and cited in his monograph). We note that *C. boothii* ssp. *boothii* from the Mono Lake region are much more densely pubescent than those collected elsewhere.

Outside California, the nearest collections are from Mojave Co., Arizona, ca. 380 km east (*Cooper s.n.* GH, cited by Raven [*op. cit.*]; Phillips et al. 1987, Annotated checklist of Vascular Plants of Grand Canyon National Park, Grand Canyon Natural History Association [no specimen citation], and *Cottam 13348* RSA). Cottam's is the only Arizona specimen we have seen; its capsules are typical of *C. boothii* ssp. *boothii*. Like the southern Mojave Desert plants, the Arizona location is far distant from the remainder of the taxon's Great Basin distribution.

Camissonia boothii ssp. *intermedia* overlaps in all character states except seed dimorphism with the two other subspecies discussed here (Raven *op. cit.*), and we find it most similar to *C. boothii* ssp. *boothii*. We examined several Nevada specimens labeled *C. boothii* ssp. *intermedia*, including some determined by Raven, that key to *C. boothii* ssp. *boothii* in Raven's (*op. cit.*) and Wagner's (*op. cit.*) treatments. One of the Nevada specimens, *J. Morefield 4647* RSA, was collected in the White Mountains, (Esmeralda Co.), suggesting that *C. boothii* ssp. *boothii* may also occur in the California portion of the range, though it has not been documented there. Other Nevada specimens we examined strongly resemble *C. boothii* ssp. *boothii*, with only their low stature supporting determination as *C. boothii* ssp. *intermedia*. On most of these plants, the fruit characters described above would argue further for their determination as *C. boothii* ssp. *boothii*. Plant stature is a weak character since young plants and those on poor sites are likely to be small. Consistent with Wagner (*op. cit.*), all California *C. boothii* ssp. *intermedia* specimens we have seen are from mountains of the northeastern Mojave Desert, White-Inyo Mountains, and Owens Valley.

Munz (1959 *op. cit.*) described the California range of *Oenothera alyssoides* Hook. & Arn. var. *villosa* S. Watson as "Kingston and Panamint mts. in Inyo Co. to Lassen Co.," and in 1974 (*op. cit.*) reported it from "the Victorville region." We have seen no *C. boothii* ssp. *alyssoides* material from the desert mountains; plants from that region are now placed in *Camissonia boothii* ssp. *intermedia*. Munz's report of *C. boothii* ssp. *alyssoides* near Victorville was evidently based only on the mis-annotated Pierson specimen. The only California *C. boothii* ssp. *alyssoides* material we have seen was collected from the Modoc Plateau: two specimens from Lassen County (*M. E. Jones s.n.* RSA [23 June 1897]; *P. A. Munz 11869* RSA) and one from Modoc County (*B. Bartholomew & B. Anderson 4812* RSA). Thus, we concur with Wagner's (1993 *op. cit.*) description of *C. boothii* ssp. *alyssoides*'s California distribution being limited to the Modoc Plateau.

All three subspecies have rarely been collected in California. The Modoc Plateau *Camissonia boothii* ssp. *alyssoides* occurrences, Inyo County and desert mountain occurrences of *C. boothii* ssp. *intermedia*, and Mono Lake *C. boothii* ssp. *boothii* occurrences are all within narrowly defined geographic regions at the western margins of their respective wider distributions in the Great Basin. The southern Mojave Desert plants may be a unique long-disjunct population, or may occur infrequently farther north as suggested by the Little Lake specimen. We conclude that they are best ascribed to *C. boothii* ssp. *boothii*, but their capsule morphology suggests introgression with *C. boothii* ssp. *intermedia*. Clearly, they are not *C. boothii* ssp. *alyssoides*. Twenty six years ago, Raven (*op. cit.*) wrote that

> Plants of this sort have not been collected in these areas for nearly 40 years. The relationship of these populations to other subspecies should be investigated when additional material becomes available.

We agree, and particularly recommend late-season searches of sandy washes on desert-facing slopes of the southern Sierra Nevada, Tehachapi, and San Gabriel Mountains to further define their distribution.

Phytolacca icosandra L. (Phytolaccaceae): New to the Continental United States.—Victor W. Steinmann, Rancho Santa Ana Botanic Garden, 1500 N. College Ave., Claremont, California 91711.

Phytolacca icosandra L. [=*Phytolacca octandra* L.] (Phytolaccaceae) is a ruderal species previously known from northern México to northern South America; it has also become widely naturalized in the Old World tropics (Nowicke, Annals of the Missouri Botanical Garden 55:294–364, 1968). Like other members of the genus *Phytolacca*, it is most frequently encountered in disturbed sites. In December of 1990 a collection of *P. icosandra* was made in the Santa Catalina Mountains of Pima County, Arizona. The plants were restricted to recently burned chaparral in a remote area of Romero Canyon at 1480 to 1800 meters. An examination of specimens at the University of Arizona Herbarium (ARIZ) revealed two misidentified collections made over 50 years ago from the Chiricahua Mountains of Cochise County, Arizona, that are also of this species (see cited specimens). While *P. icosandra* is introduced in many areas, this does not seem to be the case in Arizona. Instead, it appears to be a rare native taxon.

Plants of this species are short-lived perennials characteristic of early successional areas (Floyd, Australian Forestry 39:210–220, 1976). Scarification or high temperature is necessary to break the seed coat and allow permeability to water and/or gas. Floyd (Australian Journal of Botany 14:143–156, 1966) found that *Phytolacca* seeds had very poor germination unless heated but were able to remain dormant in the soil until this takes place. In a study of a closely related species, *P. rivinoides* Kunth &